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BRANCH OF RESEARCH

MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
RANGE RESEARCH

JUL 1930

M—5105

U. S. GOVERNMENT PRINTING OFFICE: 1929 J63661

BRANCH OF RESEARCH

July, 1930

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FOREWORD

"The Relation of a Research Worker to the Librarian"

By J. H. Webber

Before the Agricultural Libraries Section
Meeting in California in June, 1930.

"The Library to the research worker is an important set of tools most necessary in the prosecution of his studies; and to him the librarian is the skilled mechanic charged with the duty of keeping the tools in serviceable condition and ready for use.

"I do not conceive that it is a necessary part of the librarian's duty to know the intricate mechanism of each tool and all of the tools that have been devised. It is not and cannot be successfully made the duty of the librarian to know the literature bearing on any intricate scientific problem.

"It is the duty of the research worker to look up and keep records of the literature on his own special subject and to furnish lists of the books, periodicals, and papers that his work demands and which he desires to have made available in the library. It is up to him to make his own special bibliographies unless the librarian has the time available and the desire to be authorized to cooperate with him in the preparation of such a bibliography.

"It is the librarian's duty to procure the literature desired so far as possible through purchase, exchange or loan, and to assist the research worker by servicing and maintaining the collection and by making it easily accessible.

"It is the librarian's function also, so far as possible, to maintain a general collection of the collateral literature most likely to be needed, such as encyclopedias and the like.

"These are, I believe, the generally recognized functions and mutual relation of the research worker and librarian and barring the occurrence occasionally of an individual who is a 'confirmed grouch' the relationship is always pleasant and mutually helpful.

"The research worker is, however, coming to demand more of his library. Too often the paper he desires is old and out of print and cannot be obtained, or it forms a small part of a large volume or set, too expensive to purchase and too large to mail readily or too rare to be trusted in the mails. He must thus either travel to the large library, perhaps very distant, trust to imperfect reviews, or go without. The remedy is a photostat copy of the paper required. This method already has grown to important proportions but is not yet perfected. A few large libraries, one or two in a country, should establish photostat bureaus to furnish copies of any paper desired and such bureaus should be self sustaining through a charge made, sufficient for maintenance of

(Over)

service. International cooperation of library photostat bureaus would make all the publications of the world easily available. Were such means available the citrus literature of the whole world that has appeared through the centuries could be made available at any place for a very few thousands of dollars and would thus be within the reach of small stations. Were it possible to order such comparatively complete sets of citrus literature, I feel certain that a hundred sets could be placed in California.

"We look to the American Library Association to stimulate the establishment of such library photostat bureaus in a few great libraries in the world so that this boon may be made available to encourage the isolated scientists.

"Another service that the American Library Association should make possible and which research workers greatly need is that of a translation bureau. Is it chimerical to assume that one or two large libraries in the United States could be designated through such an association as yours to maintain translation bureaus for the general service of all libraries, such service to be maintained by the charges for translations? Have you ever paused to consider that a large proportion of the research man's time is given to the study of languages and the laborious reading of texts he can only dimly understand? Have you ever considered the tremendous loss to humanity that the loss of this amount of time of the most efficient scientific workers of the world means? The supplying of a standard place to obtain fair translations at a reasonable price would be a godsend to investigators and a boon to humanity. The research worker looks to the library to supply this service. Must he look in vain?"

FOREST EXPERIMENT STATIONS

APPALACHIAN FOREST EXPERIMENT STATION

General

The Station will suffer a very serious loss through the pending resignation of Dr. Korstian to organize and direct the new forestry work of Duke University. His resignation will take effect probably during the first part of November. His new title will be Director of the Duke Forest and Professor of Silviculture.

Dr. Korstian is one of the "charter members" of the Appalachian Station. Coming in 1921 from research activities in the Intermountain Region of the Forest Service he brought with him the material for eight or ten technical bulletins and articles, the last of which is now awaiting publication. At the Appalachian Station he led the field work and prepared the manuscripts for studies of regeneration of the southern spruce forest, the characteristics and management of southern white cedar, natural replacement of blight killed chestnut, and factors controlling germination and early survival in oaks, the latter a doctor's degree dissertation published by Yale Forest School. He was the compiler of the decimal classification of forestry literature that is now quite widely used in and out of the Forest Service. More recently he revised Dr. Toumey's book "Seeding and Planting in the Practice of Forestry", and was chairman of the Appalachian Section Committee of the Society of American Foresters for the compilation of the forthcoming "Cumulated Index of the Proceedings of the Society of American Foresters, the Forestry Quarterly, and the Journal of Forestry."

Dr. Korstian's present projects at the Station are the management of loblolly and other southern pines on the Coastal Plain, and the replacement of blight-killed chestnut by other species. He is associated in both these projects with A. L. MacKinney. The loss of Dr. Korstian will be felt very deeply by every member of the staff, all of whom have benefitted by his sound advice and criticism.

Complete plans for the new forestry work at Duke will be deferred pending a thorough study of needs and possibilities. In the meantime Dr. Korstian proposes to survey and inventory the Duke University Forest of about 5,100 acres, and to prepare a preliminary management plan for it. This forest is representative of pine and hardwood forest types and conditions widely prevalent in the lower Piedmont region, and is therefore expected to serve well as both a research and a demonstration forest. A cooperative research program will be developed. While the

Station regrets the loss of Dr. Korstian, we are fortunate that he is to remain in the region, and future cooperative relations with Duke University are anticipated.

The proposed work in Georgia was advanced another step by a conference between Frothingham and Director H. P. Stuckey, of the Georgia Agricultural Experiment Station, State Forester B. M. Lufburrow, C. A. Whittle, director of education in the State forestry department, and Bonnell Stone, of Blairsville, Ga. The conference resulted in an agreement to conduct the study along certain broad lines. The plans call for a survey of conditions in the important types to determine problems for future study. It is expected that a report on the forest conditions will be written as a result of the first year's work.

Margaret C. Stoughton reported July 22 to take up her duties as Junior Forester in computing and laboratory work.

Willard Bromley, Clyde R. Cochran, Harvey J. Loughhead, Chester E. Phelps, and Lawrence Sluzalis, temporary field assistants for the summer's work reported July 1. Also Hugo Pawek and Bernard Huckenpahler arrived to assist in the entomological investigations.

Bent Creek Experimental Forest

Buell, Abell and assistants worked on the station forest and methods of cutting work at Bent Creek. A revision of the forest maps was made. There is now a complete series of permanently marked stations on the forest. Letter size reductions of these maps are to be prepared. A map of the building site has been drawn, on which all the present buildings and improvements are located. On this map will be plotted the positions of proposed future buildings, and a plan for their erection will be made.

In compartments 1 and 2 of the forest three units have been laid off and surveyed. They are all in the middle slope, and are $7\frac{1}{2}$, $9\frac{1}{2}$, and $11\frac{1}{2}$ acres in size. A fifty per cent cruise of the stand on each unit has been made. Adjacent strips were run and on them every other chain was tallied, so that the units were checkerboarded with chain-square cruised areas. All trees above one inch d.b.h. were tallied by two inch classes. They were separated into two classes: overstory and understory. Wolf trees were tallied separately. The reproduction on a milacre at the end of each cruised chain was tallied in four classes: free or overtopped, sprout or seedling. These data for the three units have been analyzed, and stand tables and charts to show the nature of the stands have been made.

About one hundred trees on each unit were measured. Total age and rate of diameter growth in the last ten and twenty years were recorded. The figures emphasize the irregularity of the stands. The diversity of species and the many disturbances of the stand in the past have made it impossible to handle these growth data satisfactorily, but an idea of the present current growth of the stands has been gained, and a comparison of the rates of growth of the important species, made.

The treatments to be given these units will depend on further scrutiny of the data. The stand on one of the areas originally ran largely to chestnut. This chestnut was taken out in a salvage cutting ten years ago. Reproduction has followed, and it is planned now to clear cut the unit.

The marketing of the material to be removed may be difficult. The marking is, in most cases, likely to designate the worst trees on the units, and very little of the material will be fit for anything but firewood. However, one prospective buyer has already looked over the unit and it may be possible to get rid of the wood at a low stumpage rate.

Loblolly pine study

Korstian, MacKinney and Miss Stoughton have been working on the loblolly pine growth data. It is planned to apply multiple correlation in this study in order to determine the relative influences of several factors on increase in growth at breast height following cutting. Most of the work to date has been routine compilation.

Controlled burning in southern pines

MacKinney visited the plots at Drainland, S. C., collecting soil samples and making a plant collection. The effect of the thirteen annual burns was quite noticeable as evidenced by the ground cover. Sixteen species of herbaceous plants (exclusive of grasses) were collected on the unburned plot as compared to seven on the burned plot and several perennials were found on the unburned plot as compared to one on the burned plot. Also the occurrence of grass was much more widespread on the burned plot. It is planned to continue these plant collections until a complete collection is made for both plots.

Yellow poplar

An examination of a group of yellow poplar seed spots established in 1925, and two yellow poplar plantations established

in 1924 and 1926 respectively, on the lands of the Champion Fibre Company gave a basis for the conclusion that under most conditions plantations are much more satisfactory for artificially establishing stands of yellow poplar than are seed spots. Seed spots gave a survival of less than fifty trees per acre at the end of five years while the plantations showed a survival of over 90 per cent with an average annual height growth of a little more than a foot.

Fire damage

A party established field camp in the Natural Bridge National Forest to study the influence of the severe burn that occurred in the area April 10-11, 1930, upon reproduction, growing stock, and site conditions. The burn consists of seven thousand acres and includes considerable area where good stands of white pine and hardwoods were severely injured, complete killing of the trees in the ten and twelve inch diameter classes being of frequent occurrence.

A study will be made of the comparative resistance of species to fire, the sprouting characteristics of species following fire injury, seedling and sprout reproduction following fires in different forest types, root suckering as induced by fires, soil changes brought about by fires, and fire injury to the cambium as an avenue of entrance for heart rots and insects. The latter study will be in cooperation with Dr. Nelson, Forest Pathologist at the Station.

The party will make observations on the plots established in 1929 on the area which suffered the severe burn. These plots were originally established to study methods of cutting in mountain hardwoods.

Frothingham and Mr. Lindsay, of the Queensland Forestry Department, Australia, visited the area and with Supervisor Sears spent several days looking over the area most severely burned. The Station will assist the Forest in certain phases of the injury estimates required in connection with the damage appraisal.

Forest Biology

Burleigh spent the first part of the month on his annual report and program of work for the next fiscal year.

Following this the trapping of mammals on the Bent Creek area and the collection of birds was resumed. During the month

thirty-five bird skins were collected, representing species of sub-specific interest or of unusual occurrence. On July 11 the first fall migrant (a Least Sandpiper) appeared. On July 15 eight species of waders were noted in one shallow pond giving some indication of southward movement of these birds.

Further data will be taken on migration and will undoubtedly be of interest and importance.

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CALIFORNIA FOREST EXPERIMENT STATION

General

The State Engineer called together recently research agencies and engineers who are working on the water resources problem of Los Angeles County. Special appropriation by the Governor has been made for the compilation of all material bearing on the water problem in this county. Forest research, as it deals with the question of water, will be given a section in the completed report, and the Station has been asked to prepare the material.

Cover Types

In cooperation with the administrative organization of the Forest Service, topographic crews have, during the past three field seasons, been preparing the cover type maps in conjunction with the topographic survey projects under way. In this way we have secured a cover type map for some 2000 square miles of territory in the more rugged and inaccessible territories of the Klamath and Shasta Forests. This plan worked out so well that Regional Forester Show has been able to secure for us similar cooperation from the U. S. Geological Survey. Thus for the first time about 850 square miles will be covered by the Geological Survey with a cover type map. Clar has been assigned the job of instructing the topographers in this work. The National Park Service has covered the territory within the parks in a most satisfactory manner. We have come across a very interesting type map prepared by J. F. Eldredge for the Hoopa Reservation, showing the cover types as of 1908. Comparing it with conditions on the ground at present we find that certain brush fields have been converted to timber lands and timbered lands converted to brush fields as a result of severe fires. In southern California two crews are completing the work on the Santa Barbara National Forest and the entire job will be done by December. The final drafting

of the Santa Lucia Mountains unit, the field work for which was completed in June and is being pushed forward with the help of the Regional Office. The cover type map has been very helpful in making the classification of some of the public domain for which the Regional Office is preparing a special report. One technical assistant from the Lassen has been detailed temporarily to the Station to abstract the data that we have on hand and which may be helpful in the preparation of the public lands report.

In connection with our cover type work the crews have been regularly collecting herbarium specimens. Wieslander has sorted out about 400 of the best of these and the material has been permanently mounted. These specimens will be housed in a joint herbarium of the Forest School and the Station in the new Giannini Hall. The Station will contribute most of the woody plant material and the School the grasses and herbaceous plants. We feel sure that this combined herbarium will be of great service both to the Station and the School.

Mensuration

Reineke has been working during the past few months on the preparation of a yield table for mixed conifer stands. This study of the yield of mixed conifer stands has brought out two points of considerable interest. The first of these is that the height of the average dominant is practically identical for western yellow pine, Douglas fir, and white fir. In general, the differences between the heights of these species is not over 2 - 3 per cent, though larger differences occur on individual plots where the diameter distributions are appreciably dissimilar as a result of a high percentage of one species. However, when one species is predominant, its dominant height may be safely used for site determination.

The second point of interest is the similarity of the curves of the number of trees per acre over average D.B.H. for the various species. These curves are straight lines on logarithmic paper, of the form - log.no. of trees = k - 1.6 log av. D.B.H - where k is a constant which differs with the species. The relation shown has no significant correlation with site quality and thus may be used as a simple index of density of stocking.

Forest Influences

Erosion Survey of California

The report of the preliminary erosion survey of the San Joaquin Valley made in June by Assistant Regional Forester J. W. Nelson and Lowdermilk was completed in July. This survey represents

a part of an erosion survey of the State, particularly as it affects grazed lands. Among the findings was damage uniformly by trampling of grazing stock on new burns. Scantiness of feed impels stock to travel more for feed than on unburned areas. Absence of a covering of well rooted vegetation and the litter on surface and humus in the surface soil, exposes the ashy soil to movement on slopes into drainage channels, where in turn it is prepared for transport by storm run-off. Likewise it became increasingly evident in this survey that an adequate concept of geologic norms of erosion for the extensive foothill region of California depends upon the establishment of exclosures. Protection of such areas from grazing is not so difficult as from fire as the lands of this region are chiefly in private ownership. Allowance must, therefore, be made for certain losses by the establishment of many exclosures. Exclosures must be large enough to allow vegetation to give expression to prevailing climatic conditions.

While the term geologic norm of erosion may sound abstruse it nevertheless expresses a phase of erosional processes that must be known if measures of erosion control are to be judiciously applied. For the geologic norm represents the goal in erosion control as well as a basis of comparison of the degree and trend of accelerated erosion. Management of land for sustained production requires examples of the progress of erosion generated by erosional potentials under natural vegetative control of the surface soil. Establishment of exclosures in sufficient numbers and size is an objective to this end.

Soil and Road Erosion

Sundling has been engaged in the working up of the data of 9 series of experimental runs of the 5 erosion tanks, wherein the effect of gradient on run-off and erosion is measured. The most important indication which has thus far developed out of these data, is that, within certain limits yet to be determined, texture of residual soils has a more important influence on run-off and erosion than slope gradient.

Erosion Control Vegetation

A tentative working plan for a cooperative project for interchange of seed cuttings or plants, for the establishment of propagation and seed nurseries, and for experimental testing of plants and combinations of plants for the major purpose of revegetating eroding lands was prepared. The cooperative agencies are to include:

1. Bureau of Plant Industry
2. University of Nanking, Nanking, China.
3. California Forest Experiment Station
4. Boyce Thompson Desert Arboretum

Cooperation has been arranged between the Bureau of Plant Industry and the University of Nanking, which is strategically located to collect and test Asiatic species in nurseries and to experiment with vegetation for erosion control. Other agencies, such as the Forest Experiment Station at Keijo, Korea, and South African Forest Service are being requested to join in this systematic test of non-economic plant species which have been found useful or show promise for measures of erosion control.

A Standard Constant Level Evaporimeter

Lowdermilk has completed preliminary drawings of a constant level evaporimeter. The specifications embody two features which are believed to be important in a standard evaporimeter for bio-climatological stations. The evaporation plan is insulated in keeping with the researches of Dr. C. N. Cummings of California Institute of Technology. A reservoir embodying the Mariotte principle for maintaining a constant level is used, as well as an overflow collector to care for catch of precipitation.

Plain evaporation pans, unless floated in lakes, show important variations depending upon the setting of pans. Evaporation data from plain pans are imperfectly comparable as measurements of moisture deficit of the atmosphere. The pan as designed in accordance with the investigations of Dr. Cummings is expected to serve more nearly as a standard instrument. Blue prints will be sent to those who wish to examine the instrument. It is especially desired that suggestive criticism be made on designs of this instrument so that we may profit by the composite experience of investigators in the final design.

Products

Woods and Mill Study

Cost figures for 1929 were obtained from the books of the cooperating company and are now being worked into shape for application to the field data. Nothing further can be accomplished toward analysis of results until we have some summaries from the Laboratory tabulating equipment. When these can be run is uncertain at present because of the large amount of Laboratory Section work which must be accomplished before our jobs are resumed. The

lumber stain project is in the same suspended condition.

Lumber Depreciation

Mason has devoted practically all of his time to computation of results on this project since the summaries were received on July 7, and we shall soon be able to publish the first of a series of trade journal articles dealing exclusively with degrade by width and thickness and the values recovered through re-manufacture. For this issue of the Monthly Report, results will be confined to showing the degrade in 1-1/2-inch and 2-inch air-seasoned white fir for comparison with last month's table of depreciation for 1-inch material

Air Dry 1-5/8" White Fir (Abies concolor)
Widths 4" to 12", Lengths 10 to 16 feet.
Basis 5424 Boards (80,497 Ft. B.M.)

Original Green Grade	Volume Insp. Feet BM	Per cent of each dry grade after regrading for defects							Total Degrade %
		C&Btr	1 Com	2 Com	3 Com	4 Com	5 Com	Unmerch.	
C & Btr.	15673	87.2	4.3	2.8	5.0	0.4	0.1	0.2	12.8
1 Com	9869	-	84.3	8.7	6.3	0.3	0.1	0.3	15.7
2 Com.	18889	-	-	75.4	22.5	1.9	0.2	-	24.6
3 Com.	19824	-	-	-	81.6	17.3	0.8	0.3	18.4
4 Com.	13020	-	-	-	-	84.2	15.6	0.2	15.8
5 Com.	3222	-	-	-	-	-	98.2	1.8	-

Air Dry 2" White Fir (Abies concolor)
Widths 4" to 12", Lengths 10 to 16 feet.
Basis 812 Boards (18,952 Ft. B.M.)

Original Green Grade	Volume Insp. Feet BM	Per cent of each dry grade after regarding for defects						Total Degrade %
		C&Btr	1 Com	2 Com	3 Com	4 Com	5 Com	
C & Btr.	6634	80.3	4.2	5.4	8.8	1.3	-	19.7
1 Com.	1388	-	82.1	13.3	4.6	-	-	17.9
2 Com.	1729	-	-	59.7	38.4	1.9	-	40.3
3 Com.	5657	-	-	-	72.0	26.9	1.1	28.0
4 Com.	3212	-	-	-	-	84.9	15.1	15.1
5 Com.	332	-	-	-	-	-	100.0	-

Summary Showing Comparative Total Per Cent Degrade in 1", 1-5/8" and 2" Material

Original Green Grade	THICKNESS 1"	1-5/8"	2"
C & Btr.	23.4	12.8	19.7
1 Common	22.6	15.7	17.9
2 "	39.2	24.6	40.3
3 "	16.6	18.4	28.0
4 "	5.4	15.8	15.1

No computations of mill run degrade can be made until the mill study summaries are at hand to show the percentages produced by grades. The figures given above must also be adjusted further when we have the information on the percentages of widths produced within each thickness-grade division. The degrade of 12.8 per cent in C & Btr., 1-5/8" thick, for example, is based on 15673 feet B.M. of this grade and thickness with a distribution of widths as they happened to occur in the piles selected for study. This distribution was as follows:

4" - 11.8 % (by volume)
6" - 6.4 % " "
8" - 73.1 % " "
10" - 6.8 % " "
12" - 1.9 % " "

The actual mill production data by widths in 1-5/8" C & Btr. will probably show a lower proportion of 4" and greater proportions of 10" and 12" stock. Degrade increases with increased width, consequently any changes in width distribution as shown by the green chain tally for logs of different diameters will vary somewhat from the averages given above. The degrade for each width in the 1-5/8"

C & Btr. was 4.4% for 4", 2.9% for 6", 11.6% for 8", 38.4% for 10" and 56.1% for 12". The reliability of the last figure must be discounted because only 301 board feet was inspected, but the other thicknesses prove that 12" white fir is a "bad actor" and should be cut only in amounts sufficient to fill the wants of the few customers who demand this size. 1" x 12" C & Better depreciated 34% (basis 1847 feet) and 2" x 12", 30% (basis 3714 feet.)

Lumber Census

The lumber census for California and Nevada was completed after a long wait for the returns from one of the largest operators in the Region, who encountered some difficulties with the new forms introduced this year. A preliminary statement was prepared by Miss Towle and sent to the Census Bureau for approval. Until they have checked the figures we shall mention only that the total cut exceeded that of 1928 by about 5½%. After all the talk about the evils of overproduction and the alleged curtailment program followed by some of the larger mills for a short period during midsummer, one would expect a decreased output. Some plants did actually cut down to a five day schedule for several weeks but inasmuch as they overlooked the necessity for curtailing log production in the woods, the mills simply ran far enough into the winter months to take care of all the timber sent to the pond. "Curtailed production" should be translated to read "postponed production."

Southern California

Devil Canyon Branch

Effective work with a Fordson tractor completed a system of firebreaks and trails through the rank weed growth at Devil Canyon, giving the Branch a reasonable security from fire. The coniferous arboretum on a slope too steep for the tractor was given a much needed "liberation weeding" by hand methods, an operation which is being extended to other plantings as time permits. The rapid extraction of available soil moisture from the root-zone of newly planted trees by a dense mat of fast-growing weeds and grasses is probably the chief cause of failure of planted stock in old cleared lands of southern California. The weed cover is so luxuriant and its growth so rapid that it reduces the soil moisture content to the wilting point long before the new tree roots are able to grow beyond the weed-root zone. Overcoming this difficulty, where weed control is not feasible, may lie in deep planting of especially long-rooted stock with which the greatest care has been taken to avoid

injury to the deepest root-tips. Such a planting procedure, involving deeper, more careful lifting as well as deeper planting, is at great variance with the northern practice of root-pruning, and signifies that planting in southern California is bound to be more costly than elsewhere in the country.

Examination of planting experiments afield disclosed the following facts of interest:

Lytle Creek R. S.

Elevation 2750 feet. Incense cedar and Arizona ash appear conspicuously better than some twenty other species. This plantation, which incorporates a cooperative test of many pine species for the Eddy Tree Breeding Station, has been watered intermittently since planting.

Lone Pine Canyon

Elevation 4500 feet. In bare-root Coulter pine plantations, the check rows, unprotected, showed 16 per cent alive as against 11 per cent for one shingle shade, 5 per cent for two-shingle shade, and even lower figures for other forms of protection.

Heap's Peak

Elevation 6200 feet. On July 17 western yellow pines from two California forests showed 94 and 97 per cent alive, Jeffrey pine 95, the variety "scopulorum" from Colorado 85, ponderosa from the Coconino 80, knobcone pine 80, Coulter pine 72, sugar pine (potted) 100, and incense cedar 94. A small group of bigtree (Sequoia washingtoniana) showed 100 per cent alive and the significant fact that several plants which had been broken off by cattle were sprouting from the stump. Deep rich soil and a good growth of bracken and wild pea make this an excellent planting site. Although too early for conclusions, these results encourage the hope that the big "sugar pine burn", in which the site lies and which is traversed by an important scenic road, may possibly be reforested. Much of the mortality among the trees was traceable directly to mutilation through trampling or burial by cattle.

By way of cooperation with the carbohydrate division of the Bureau of Chemistry and Soils in Washington a quantity of fresh root stalks of wild licorice (Glycyrrhiza lepidota) were dug in the vicinity of Riverside and shipped to H. S. Paine, chemist in charge of carbohydrate studies. It is understood that a comprehensive study is being made of native plants used by American Indians.

Kraebel spent some time in the foothills east of Bakersfield securing photographs of accelerated erosion traceable largely to overgrazing. In this region of scant rainfall the quick-greening foothills make good winter sheep range but long years of excessive stocking have resulted in marked deterioration of the vegetation and in the occurrence everywhere of great erosion scars which are growing steadily larger. The soil of the region is a deep clay loam, very easily eroded and much perforated by ground squirrel burrows which serve to accelerate deep gullying at an astonishing rate whenever a small streamlet finds its way into them. In many places a pavement of water-worn cobbles marks the exposure of underlying cemented gravels and testifies to the complete loss of the ancient mantle of fertile soil. Such areas support the scantiest possible growth of tarweeds and other poor-soil species quite worthless for grazing purposes. Altogether, the region is a striking monument to shortsighted grazing policy.

Kraebel stopped briefly in Sequoia National Park to discuss planting problems with Superintendent White and Park Naturalist Been. Of the 300 incense cedars sent to the Park last spring from Devil Canyon Nursery nearly all are growing vigorously. The problem in the National Parks seems to be not only the recovery of artificially denuded areas, as by road construction or defacing fires, but the probable necessity of strengthening the forest itself in areas of concentrated travel. In such areas the naturalistic planting of indigenous species seems entirely compatible with the primary purposes for which the National Parks were established. The abundance of natural reproduction of Sequoia washingtoniana in Sequoia Park gives assurance of continuance of the species but what will be the fate of the old veterans under the increasing pressure of travel is problematical.

Consulting Entomologist

Person spent the first part of July in travel and in visiting some of the other field projects in the northern half of the state. A few days were spent at Berkeley and at Palo Alto where the entomological work in progress was discussed with Craighead, Miller, and Hatch. The return trip to Hackamore was made by car in company with Craighead and Miller, and stops were made at Struble's field camp at Strawberry where studies on white fir insects are in progress and at the Eddy Tree Breeding nursery where the plants were examined for tip moth injury. Although this type of injury presented quite a problem last year very little damage was noted at this time.

Craighead, Miller, Keen, and Beal all spent a few days at Hackamore reviewing the work there and discussing plans for further work, particularly cooperative studies between the two stations. On the 16th and 17th a trip was made to Medicine Lake

where a serious mountain pine beetle epidemic in lodgepole is threatening the stands around the lake. A project will be recommended for the control of this outbreak.

The remainder of the month was spent at Hackamore where a number of trees are being treated by the biological control method of exposure and the effects on both the western pine beetle and its predators are being followed. Jeffrey and Durbrow are continuing their studies at Buck Creek on the relation of sugar concentrations and pH of the inner bark to attractiveness.

Trees seriously defoliated by Sugar Hill fire of 1929 are showing a decided sucrose hydrolysis that is believed to be associated with increased attractiveness to the western pine beetle.

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CENTRAL STATES FOREST EXPERIMENT STATION

General

Four field parties were employed during the month. The number of temporary field assistants was increased by three on July 1, bringing the total to eight. These man are working under direction of Kellogg, Day, and Auten on three active projects of the Station.

Excessively dry weather continued through July. Grass field fires were seen in southern Michigan and Ohio during the last part of the month. Severe forest fires occurred in southern Ohio.

Oak Yield Study (TS-12)

Barrett completed the measurement and report on the permanent chestnut oak seedling quadrats in southern Ohio. Reexamination at the end of the first year showed an exceptionally heavy mortality at Rock House State Park. The two quadrats showed mortalities for the past year of 89.8 per cent and 95.5 per cent. These figures are in striking contrast to the conditions found on similar quadrats in which mortality ranged from 0 to 63.6 per cent with an average of 28.3 per cent. The cause of this heavy mortality apparently was some form of root rot.

Litter Study(M-1)

Auten with two assistants studied virgin sites in Ohio. Twenty-six sites were visited. Of the twenty-six, fifteen were considered sufficiently undisturbed to warrant taking observations. Of the fiteeen observed, only three could be called virgin.

One surprising fact appears from the study in regard to litter depth. On no site observed in Ohio, on plots well distributed throughout the state, was there more than an inch of litter. Only two years litter may be found intact. Litter of the third year has disintegrated into fine particles. The soil humus or A_1 horizon is in general thin, 1/4 to 1 inch.

One phenomenon is common in forest soils of this region, that is the porosity of the lower horizons. This porosity was found on one soil at a depth of 72 inches. Close examination shows that this tube-like porosity is caused by root penetration. In many soil samples the tubes would still contain the outer cortex of the rootlets. On two virgin areas studied for apparent specific gravity of the soil, the virgin sites showed much greater porosity than did cultivated fields adjacent. As a result of forty tests on one site, the forest soil in the upper 9 inches showed 14 per cent more pore space than did the cultivated soil. On another site the forest soil had 9 per cent more pore space. The samples were taken in mineral soil below the litter in order to be comparable with the cultivated soil. This greater porosity was not expected in the surface soils, since cultivation favors eluviation. It seems logical that a greater disparity will be found in the lower depths because the colloidal material will have rendered the cultivated subsoil more compact than forest subsoil. The past month has been particularly favorable for making comparative soil studies because of extreme dryness. Clay subsoils, ordinarily plastic when wet, were easily crumbled because of lack of moisture. This was particularly true in the woods.

All around the Little Mountain White Pine Forest east of Ashtabula are maple-beech woods on mull soils. This one site is white pine-rock oak on the ridge and hemlock on the slopes and the soil shows distinct podsolization. The soil itself is merely a thin horizon of weathered Pottsville conglomerate, not over 24 inches in most places and as little as 4 inches in many. In the cool depths of the ravines, ferns and cool temperature plants abound. Nearby are tulip poplars and maples and hemlocks. Farther up the slopes are mixed oaks, while on top are the white pines. A wide range of vegetation of all kinds is present.

Two more interesting sites are in the southern part of Ohio. Near Portsmouth is a virgin tulip poplar cove. A photograph was made of twin tulips, one 47 inches in diameter, the other 41 inches. Near Gallipolis is an excellent stand on moist, well-drained soils comprising 200 acres of virgin woods. One shell-bark

hickory 39 inches in diameter and 156 feet high was noted. This forest is on Meigs silt loam and the litter is thin, 3-4 inches in many parts.

Plantation Study (Fp-1)

A second party went into the field on July 2 to continue measurement of plots in black walnut stands in Iowa. Ben Lucas is chief of this party, the other member of which is R. O. Sowash from Michigan State College. Enroute to Iowa, this crew prepared maps of several of the 1928 plots.

Kellogg discussed with Professor G. B. MacDonald at Iowa State College the current plantation project. At Des Moines, Kellogg called on one branch of Penrod Jorden and Clark, manufacturers of walnut lumber and veneer to secure data on the use of plantation-grown walnut. A similar contact was made at the branch of the same concern located at Kansas City, Missouri. This plant uses far less planted material than the one at Des Moines, as the logs are shipped to Kansas City mostly from the Ozarks, Arkansas, eastern Oklahoma, and portions of Kansas and Missouri where plantations are lacking.

Following is a summary of plots measured this season to date:

Species	Plots	Notes Only
Butternut	1	-
Chestnut	-	1
Silver Maple	1	-
Mixed Hdwds	1	-
White Pine	1	-
Black Walnut	57	10

Opportunity was found to secure measurements on the remaining trees in a chestnut planting in Marshall County. This planting, made about 1885, throve well until a year in which a very open winter brought a sudden and very severe cold spell. All but about 12-13 trees were killed. The survivors as well as those which perished had borne fruit regularly and abundantly. Trees have grown to 60 feet in height with fairly large diameters but rapid taper. It appears that the sudden and radical fluctuations of temperature in the Middle West are inimical to chestnut. Chestnut would make an unusually valuable tree for the midwestern farm and might be preserved for limited use at low cost were it not susceptible to sudden weather changes.

A few plantings are appearing with few or no frost cracks on the butts of black walnut. This suggests the possibility of this damage being in a certain region or zone. One planting in

Hardin County, Iowa, showed frost cracks on only 8-10 trees grouped in the corner of the planting at lowest elevation. At a walnut planting in Des Moines, the scaler, who notes all defects on logs, remarked that most frost cracked timber comes from logs shipped from Wisconsin and northeastern Iowa, and that timber around Des Moines and southward showed very little of such defect.

Woodland Grazing Study (Pa-1)

Field examination of the "classified woods" of Indiana has been completed. This study covered over 120 farm woods in the better agricultural sections of the state. Forty semi-permanent plots were established and measured. All of these areas had been heavily overgrazed in the past but are now being protected from livestock in accordance with the requirements of the state law. A number of these woodlots are suitable for the establishment of permanent sample plots.

Excellent cooperation has usually been extended by the owners of these classified areas which has been a pleasant surprise, considering the usual indifferent attitude of the Corn Belt farmer to his woodlot. Several owners have voluntarily assisted in fencing small areas against livestock in adjacent pastured woods to study recovery and one very interested owner is discing up an acre of tight sodded oak-hickory woods to assist in determining if this will aid in hastening the recovery of these overgrazed areas, and if the percentage of oak and hickory reproduction will be increased thereby.

Mr. Safely of Plymouth, Indiana, described his woodlot experience. About five years ago he was forced to turn a number of head of cattle into his fifteen acres of beech-maple woods because of shortage of pasture. The stand had been rather heavily opened up about ten years ago by cutting and a good grass sod had developed. The cattle seemed to get along well on the area with some supplementary feeding, so he did not provide additional pasture but kept the eight head of cattle in the area more or less constantly for several years. Three years ago he noticed that a few of the older trees of beech and sugar maple were becoming stagheaded. On closer examination he found that these trees were invariably the ones under which the cattle collected for shade. He decided that the packing of the soil and injury of the surface roots by the cattle was responsible and conceived the idea of protecting these trees by rocks. He cultivated around the base of all the trees in the section of the woods where the stock generally congregated and then placed rocks for a distance of about 8 to 10 feet from the base of these trees. This gave sufficient room for soil aeration about the roots and still left ample area for shade for the stock. He states that

he has seen no further evidence of stagheadedness and pointed out two trees in which side limbs were assuming dominance and would soon overtop the old dead top.

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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

The Secretary of Agriculture, early in July, formally approved the establishment of the Intermountain Forest and Range Experiment Station with headquarters at Ogden. Research work in the region had already been expanded during the past fiscal year but formal establishment of the Intermountain Station had been delayed pending increases in funds to start work on forest management in the region. Such funds became available on July 1.

The Intermountain is the twelfth regional station to be established in the continental United States. It involves no particular modification of the work already under way except to give it regional recognition. The old Great Basin Experiment Station with field headquarters on the Manti National Forest is being absorbed as a branch sub-station. A formal name for this station will be adopted later.

Assistant Forester Clapp made a trip to the region the middle of May and together with Forsling and Regional Forester Rutledge made a survey of the possible cities for locating the headquarters. There was keen competition between Logan, Ogden, and Salt Lake City, with the Secretary's decision in favor of Ogden where temporary headquarters of the Great Basin Station have been maintained since 1922. Location at Ogden will afford opportunity for contact with both the Agricultural College at Logan and the State University at Salt Lake City, as well as close contact with administrative headquarters of Region 4 at Ogden.

The Intermountain Station has outgrown the quarters in the Region 4 office and will procure office space elsewhere in Ogden until a proposed new federal building for the Forest Service is completed.

Forest Management Studies

L. F. Watts, who has been assigned for the past year on the range-erosion project, was assigned on July 1 to take charge of the western yellow pine project. He left Ogden July 5 for a trip to California to go over the work and methods being used by

the California Forest Experiment Station. From California he returned to west central Idaho where he will begin a round-up of existing information on western yellow pine in the region.

Floods

Serious floods similar to those of 1923 occurred in parts of Utah on July 10. There have been other floods the latter part of July and early August. These floods offer an excellent opportunity for the study of the influence of plant cover to torrential run-off and erosion. The Station is cooperating with the Utah State Experiment Station in this study. Reed Bailey, geologist, and R. J. Becraft, professor of range management of the College, have been assigned by the State Station on the study.

The Utilization Problem

July 4 and 5 was devoted to a range utilization conference at the old G.B.E.S. branch station. Those in attendance were Inspector of Grazing R. R. Hill and Plant Ecologist W. A. Dayton of the Washington office, J. O. Stewart and Arnold Standing of the Regional office, and Forsling, Nelson and Hormay of the local station. This was an attempt to get together on ideas of utilization as developed at the station and by administrative men in the Service.

Dayton remained at the Station until July 10 to make a check of the various herbaceous species on the station's experimental areas. Considerable difficulty has been encountered in the past in the identification of several of the Agropyrons, Stipas, Mentensias, geraniums and several other genera. Plant specimens of these, as well as other doubtful species, were collected and will be submitted to Washington for further study.

Spring-Fall Range Study

Pickford early in July completed the spring season's field work on the spring-fall range study in Utah and is busy compiling the information he has gathered. Extensive studies were carried on on the west side of the mountain and plateau backbone which traverses the state from north to south and in the Uintah Basin.

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Behre made a trip to Albany on July 2 to confer with State Forester Howard regarding the need for studies of planting and plantations thruout the Northeast. This has become a matter of vital importance in view of the greatly increased program of reforestation, particularly in New York State.

Westveld, in company with E. S. Bryant, consulting forester, and R. D. Stephens of the Eastern Manufacturing Company, spent the early part of the month visiting several hardwood girdled areas in Maine. The most interesting and informative of the girdled areas visited was a series of plots established by the Eastern Manufacturing Company in 1919 about 30 miles west of Patten, Maine. In addition to a check plot there were two treated plots; one on which hardwoods were girdled for only a portion of the circumference of each tree; the other on which 100 per cent girdling was practiced on all hardwoods down to 2 inches d.b.h. Practically all of the hardwoods on the partially girdled plot were still alive. On the 100 per cent girdled plot all hardwoods with the exception of 2 maples where bridge grafts had developed had died. In fact, 90 per cent of the hardwoods had already fallen to the ground during the eleven year period which had elapsed since the trees were girdled, and without apparent damage to the softwoods.

The area was last cut over for softwood logs in 1893 to 12 inches on the stump. As a consequence the material released thru girdling consisted largely of trees of pulpwood size. It is on stands of this character, of course, that earliest and surest returns from girdling can be realized since the increased growth is being added at once in the form of merchantable material. Cores obtained from the released spruce and fir show a remarkable accelerated diameter growth.

On the other girdled areas visited the bulk of the material released was of reproduction and sapling size. These size classes also show remarkable response in growth. A rank growth of hardwoods, however, sprang up a year or two after girdling and is competing strenuously with the young conifers for possession of the area. Unless the new hardwoods are weeded back many of the small conifers will be eliminated from the stand.

The summer meeting of the Research Council was held this year on July 24 and 25 at Waterville, New Hampshire. A good representation of the Council membership was present. A number of visitors including Stabler from Washington, Supervisor Scott of the White Mountain National Forest, and Elwood Wilson of the Canada Power and Paper Corporation, were present at the meeting.

Following the business meeting held on the evening of the 24th Supervisor Scott and District Ranger Salmond gave extremely interesting talks on objectives of the administration and activities on the White Mountain National Forest. The next day was devoted to an inspection of the experimental work underway in the Waterville Valley and a visit under the leadership of Ranger Salmond to typical areas cut over under the supervision of the Forest Service.

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NORTHERN ROCKY MOUNTAIN FOREST EXPERIMENT STATION

Annual examination of reproduction quadrats was the work of the month for Haig and his two field assistants. It now takes practically the entire time of a three-man crew for the field season to make the annual and periodic examinations of the Station's permanent sample plots. The first part of July was spent in continuation of work on plots in the Priest River area and the latter part on plots in the Coeur d'Alene center. The experiments in the latter locality are concerned largely with hemlock competition. A summary of the reproduction counts indicates the situation. On one plot, which represents a shelterwood cutting in 100 year old timber, the results four years after logging are 32,500 hemlock, 4,960 white pine, and 480 mixed seedlings per acre. Another plot representing seed tree cutting in 160 year old timber showed a result two years after logging of 5,400 hemlock, 1,450 white pine, and 150 mixed seedlings per acre. The remaining stands in both cases contain a great preponderance of pines with abundant and satisfactory seed trees. The marking aimed to reduce to a minimum the hemlock seed supply, but hemlock persists in germinating in enormous quantities as illustrated by the 21,875 new hemlock seedlings per acre recorded this year on the shelterwood plot.

Another bit of interesting information reported by Haig resulted from his examination of a weeding plot and its check established by Weidman five years ago. The suggestion for this little experiment came to Weidman after seeing Professor Fisher's successful weeding of white pine and hardwood sapling stands in the Harvard Forest. The present small plot was established in 20-25 year old reproduction containing 34,000 stems per acre of which 82 per cent was hemlock, 8 per cent white pine, and the remainder largely Engelmann spruce with some larch, fir and cedar. The average crown level was 5 to 8 feet and the extreme heights 18 feet. The weeding operation left a total of 7,900 stems per acre as follows: 2600 white pine, 3200 spruce, 1000 hemlock, and 1100 others. The interesting feature of the present examination is that the liberated white pines have made distinctly slower height growth than those in the check plot. This seems to verify an observation that we have made in several other instances, viz., that sudden and heavy opening of the canopy stunts western white

pine crowns and their growth for several years. It seems to hold in 60-year old timber as well as sapling stands. The height growth for the first 5 years after liberation on the weeded and check plots is as follows:

Crown Class	Height Growth in Feet and Tenths	
	Weeded Area	Check Area
Dominants	2.6	3.7
Co-dominants	1.8	2.9
Intermediates	1.1	1.9
Suppressed	0.6	1.1

If these 25-year old trees behave in the same way as 60-year old trees in thinning plots, recovery and good growth will take place from now on.

Some additional work was done by Gisborne during July in organizing the study of the Region 1 fire records. Compilation sheets and punch card heads were designed to utilize practically all of the information on the original fire reports and to group these items on four cards for the following specific purposes: (1) to determine the character of the fire problem by timber types; (2) to furnish the data on hour control necessary in determining what control must be provided in each timber type in order to hold area burned within the limits of permissible loss established by the Washington District Foresters' conference; (3) to compare presuppression and suppression costs and results in the various timber types; (4) to determine inflammability types within each timber type. In all cases the effects of human failures in either preliminary or suppression action are tabulated and coded so that results of these errors may be determined separately from action not characterized by such errors.

The installation of a first-order weather station on the roof of the Federal Building was another activity of the fire research man this month. F. C. Crombie, of the Spokane office of the Weather Bureau, came to Missoula expressly to cooperate with Gisborne in this work. The quite complete set of meteorological instruments, including a quadruple register, was generously placed at the disposal of the Forest Service by Dean Spaulding of the Montana School of Forestry, which is the owner of the equipment. The purpose of setting up and operating the station is to secure first class weather records during the fire season for the local use of the Forest Service and private timber owners interested in protection. Morning weather readings are telegraphed to the Spokane office of the Weather Bureau to assist in localizing the daily forecasts for this part of the region. The equipment furnishes automatic records of rainfall, temperature, humidity, sunshine, wind direction, and wind velocity. Wesley Wertz, a competent temporary man on the Missoula Forest, has been trained

and assigned to the operation of the station, including twice daily measurements and the sending of the daily report to Spokane. The station will be operated only during the fire season.

As one result of the transfer of this meteorological equipment considerable local interest has been aroused in the attempt to secure a first-order official Weather Bureau station in Missoula, which is now served only by a small cooperative and semi-paid station. At a recent meeting of the Chamber of Commerce Gisborne was called on to explain the need for a year-long station and the Chamber is initiating action to obtain a Congressional appropriation for this purpose. During the past year H. R. Flint of the Regional Office has also explained this need to several of the local service clubs and there seems to be considerable active interest in the movement to secure an adequate station.

The Priest River Branch Station had the pleasure on July 30 of an overnight visit from the Forester, Regional Forester, and Congressman Simmons, chairman of the Agricultural Committee. The party was spending four days in Region 1 to get a cross section of Forest Service work in this territory. A chicken dinner at the Station mess after a late arrival in the evening apparently put the party in a most satisfyingly receptive state of mind to see some of our research work. At least they proposed getting up at 5:30 o'clock the next morning in order to have two hours for that purpose before leaving on schedule at 8:30 A.M. What is more to the point, all hands were up at that hour and out with Weidman for an hour's inspection of one thinning and two methods of cutting plots. After breakfast Gisborne showed off one of his weather stations and spent the remainder of the allowable time describing the fire studies. Supervisor Ryan and Director Weidman accompanied the party on the trip through the Kaniksu Forest.

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

General

The month of July was chiefly a month of office work for the Forest Survey personnel and for the Director and a month of field work for all of the Forest Management staff. Munger made a short trip through western Washington in which he spent three days with McArdle. The latter was then making headquarters at the Pack Forest at the University of Washington where Dean Winkenwerder has been most hospitable in encouraging us to use their facilities. Munger visited en route the Western Washington Agricultural Experiment Station at Puyallup, the forest supervisors at Tacoma and Olympia,

the Weyerhaeuser Logged Off Land Company, the State Forester but failed to find in Olympia other State officials upon whom he called.

Among the out-of-town callers at the office were Mr. Donald Bruce of Mason and Stevens, Mr. Tom Gill of the Pack Foundation, Mr. Ralph Hopping and his son both of the Canadian Entomological Service, Mr. Ellis of the Logging Underwriters Insurance Association, Mr. Craighead of the U. S. Bureau of Entomology, Mr. Cowan of the Washington Forest Fire Association, Mr. Fillipo Silvestris, an Italian forester and Mr. Crosby, editor of the West Coast Lumberman. This perhaps indicates something of the variety of the Station's contacts.

Natural Reproduction Studies

During the last half of July, Isaac made the first seasonal examination of the natural reproduction plots in the Douglas fir region. Last year the seed crop was light and as a result the number of new seedlings was less than the number that died since the last examination, leaving a net loss in reproduction for the year.

A check of the vegetative cover on the plots indicated an average reduction in density of approximately 10 per cent that probably resulted from late frosts that were reported from various parts of the region. Bracken fern and fireweed particularly showed evidence of heavy frost damage. In only one instance was severe injury to new growth on reproduction noted and it is probable that the reduction in vegetative competition resulting from frost aided seedling growth.

Sample areas of direct seeding on the cutover lands in the fog belt, wherein the small seeded species (sitka spruce, western hemlock and western red cedar) were used, showed an abundance of seedlings on both the 1929 and the 1930 seeding when the plots were checked in July. If the seedlings continue to live in sufficient numbers, this method of securing restocking offers possibilities on the wide expanses of denuded rough land in that region.

Mensuration

With the preliminary measurements completed on the four new "Methods of Cutting" plots established on the Malheur Forest, Kolbe and field assistant Stewart began early in the month to help out with the field work for the yellow pine growth and yield study. It is expected that they will be able to complete the Oregon work for this project sometime during the coming month after which they will move north to help Meyer get the Washington data before autumn arrives

with all its sample plot work. Meyer continued through the month with two assistants the growth study of western yellow pine in eastern Washington. He spent a few days with Kolbe in eastern Oregon to see that the work of both crews was coordinated.

Douglas Fir Slash Disposal

During July McArdle established 4 permanent sample plots for the Douglas fir slash disposal study and reexamined 26 plots in Washington and northwestern Oregon. The results of these examinations are now being computed and tabulated and all analyses are kept up-to-date in order to learn if additional information should be obtained. McArdle is examining a large number of logged-over areas, especially those more than 10 years old, and with the local fire wardens is attempting to rate the present fire hazard of these areas and to compile "case histories" which will assist in determining how slash should be treated in order to obtain certain desired results. A part of the slash disposal study deals with the ecology of logged-over lands and McArdle has spent a few days in the field with Isaac to learn how the information obtained in the latter's studies of Douglas fir natural reproduction can be used in the slash disposal study. The slash disposal study was also discussed with C. S. Cowan (head of the Washington Forest Fire Association) and J. B. Woods (Forester for the Long-Bell Lumber Company). As a part of the investigation of fire hazard of logged-over lands, the moisture contents of fuels under various types of cover have been obtained simultaneously in adjacent areas, and a more intensive study has been made in certain localities to determine the seasonal change in moisture content of woody fuels and the effect of different types of cover in retarding the drying of these fuels.

Fire Studies

Three fires on Douglas fir logged-over lands were studied by McArdle. On a small fire in previously burned slash the efficiency of the tractor-drawn plow of the Washington Forest Fire Association was studied. On level land this equipment made a trail four feet wide at the rate of about one mile per hour, including the time spent in pushing or pulling large logs away from the trail.

During the month Simson installed static meters in the central dispatchers offices at Sumpter, Oregon, Twisp, Washington and Summit Meadows Ranger Station on the Mt. Hood National Forest in Oregon. This completes the installation of five static meters begun last month as an experiment to determine their effectiveness in indicating the probability of thunderstorms in the vicinity.

Wind River

Since his return to Wind River Simson has been cooperating with Beatty on the radio communication experiments being carried on on the Columbia National Forest. At present there is a central radio station (voice) at Wind River and seven portable transmitter-receivers in operation on the forest.

Forest Survey

Private cruise records continue to be gathered in at the rate of about one-half million acres a month both by correspondence and by calling on the offices of the companies in Portland and neighboring towns. Moravets and Bolles have taken up their residence in Seattle and Tacoma for two or three months to contact the timberland owners there.

In Columbia County, Oregon all of the existing records that can be found have been compiled and Briegleb and Litchfield spent several days type mapping such areas of second growth or conspicuous young growth as they could by extensive methods. This leaves about a hundred sections in this county of logged off land which cannot be placed in the category of reforesting or non-reforesting by merely extensive field methods. Accordingly, 47 miles of arbitrarily located strips will be run, to get a correct picture statistically of these areas; this will complete the outside work of the Forest Survey in Columbia County.

James W. Girard arrived the last of the month to serve on the Forest Survey as timber cruising and logging engineering expert. A. R. Wilcox has been detailed by the Regional Forester to make the Forest inventory of the Siuslaw National Forest. This was one of three forests in the region upon which no work was underway, leaving now only the Snoqualmie and the Santiam as lagging.

Munger spent some time arranging cooperation from both states in the preparation of new base maps for the Forest Survey to use in presenting its type, maps of the right scale and sufficiently up to date not being in existence for either Washington or Oregon. Three agencies in Oregon have promised $2500, which is nearly all that is needed and in Washington the State Forester has assured us of $750.00 as a starter.

Forest Insurance Study

Since coming to the Station, Shepard has made several field trips in Oregon and Washington acquainting himself with the region and contacting local people. Since it appears that the study will need

to analyze fire damage in the field the field trips have so far been designed, to a considerable extent, with the idea of giving particular attention to cruising and valuation technique.

The first field trip was made with McArdle, whose work on relative hazard and fire behavior will make very definite direct contributions to the insurance study.

Effort is being directed just at present toward the devising of definite plans for collecting field data on actual fire damage for the purpose of determining with sufficient accuracy the total or absolute fire hazard of the region as indicated by past experience. Detailed study of a very considerable number of areas burned over during the past two years will furnish a sound basis for use and interpretation of existing records and other data.

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SOUTHERN FOREST EXPERIMENT STATION

General

Our staff has been increased by the arrival on July 1st of Frank D. Heyward, Jr. On July 14, R. R. Reynolds, assigned to the economic study and J. W. Cruikshank, the first man on the ground for the Forest Survey crew, and on July 28, Miss Ruth Marshall, to help carry the general clerical load. H. J. Eberly, Hine's successor as Clark-McNary Inspector arrived about the middle of the month.

The general drought continued practically throughout the Station territory, several places receiving no rain whatever during July. Hempstead County, Arkansas had had no rain since May 11, and in some of the northern counties in Mississippi the ground was so dry that the erosion crew found it impossible to set temporary stakes in mapping and resorted to cutting notches out of the ground with an axe. There were more summer fires than usual and the crops have suffered badly.

The staff members at New Orleans held a vociferous meeting to discuss the revision of the forest type classification drawn up by the Gulf States Section Committee, of which Pessin is Chairman. The Southeastern Section also completed a provisional type classification under Wyman's Chairmanship.

Meginnis spent a day with Messrs. Plymale of the Kisatchie Purchase Unit and W. W. Ashe of the Regional Office, examining several sections of virgin longleaf owned by the Peavy-Wilson and Crowell Spencer Lumber Companies adjacent to Government land in the Kisatchie Purchase Unit. It is hoped to purchase a block of virgin longleaf pine

for research purposes and as a means of preserving an example of a fast disappearing type of stand.

News was received of a rather drastic retrenchment policy of the Long-Bell Lumber Company effecting considerably the Company's forestry work in Louisiana. The Company has reduced salaries and wages something like ten per cent and has let many men go, including John Tyler, Assistant to A. D. Read, the Resident Forester at DeRidder. Read is left without nursery labor and is trying to pull several million six month old seedlings through the summer with no help other than that of his ten year old boy. It is not known what effect this policy will have on the Company's seed collection and planting this fall and winter, but there is almost certain to be some setback, which is most unfortunate in the light of the excellent progress which had been made during the past couple of years.

We learned through the Forestry Department of the Great Southern Lumber Company at Bogalusa that the Great Southern plans no salary reduction and practically no laying off of men despite the current depression. There seems to be no curtailment of forestry work in the forestry department and they had a number of consultations with the Station's staff concerning the preparation of a management plan for the entire holdings of the Company. The Great Southern expects to plant approximately 1000 acres of slash pine this winter.

During the month Pessin broadcast over Station WWL on "The Structure and Life of the Forest Tree." Demmon revised Field Assistant Bennett's paper on "Scrub Oak on the Choctawhatchee National Forest," putting it in shape for publication if Bennett wishes to send it to any available periodical. Bennett's general conclusion was that on the deep sterile sands characteristic of the Choctawhatchee, the scrub oaks exerted a beneficial influence on the reproduction of longleaf pine. Demmon also went over two papers by Lentz and Sinclair on erosion in Mississippi, and they are now ready for publication. At Starke, Harper completed a report on the effect of various fertilizers on gum production and also prepared an article for the U.S.D.A. Yearbook on the "Mortality of Second-growth Pine in the South Caused by Turpentining." Rudolph prepared a working plan for the Study of Effect of Light Annual Fires on Gum Production, and also worked on a report on the Effect of Light Annual Burning on the Growth and Survival of Young Slash Pine Timber. Wyman spent part of the month on his manuscript on "The Effect of Environment on Gum Yield."

Protection Fire

Chapman burned two fire plots in Greeley pasture at Urania. A very hot fire in the Elk Pasture at Urania killed practically all the trees, (mostly longleaf, up to 20 ft. high) on about 40 acres.

Heyward worked up data from two successive cone crop counts at McNeill, to show effect of continued burning on cone production. The counts showed a definite but not very strikingly significant superiority in production on the unburned half of the pasture.

On the Ouachita Chapman reexamined the silvicultural improvement (poisoning-of-hardwoods) plots. Data so far worked up indicate that black, red, and black jack oaks are killed back fairly easily by girdling alone, white and post oak and hickory somewhat less easily killed back, and elm and black gum killed back least easily of all. Analyses so far completed show that arsenic is more effective than either girdling or sodium chlorate in killing back the species not easily killed by girdling alone, but that the arsenic seems to stimulate sprouting from points below the girdle.

Of the current work on thinning plots handled at the Starke branch, everything is about completed except for a week's job on two plots laid out by Righter at Cogdell, Georgia.

Naval Stores

At Starke regular chipping and dipping continued uninterruptedly during the month. Office work consisted mostly of work on current computation, the preparation of reports and articles already referred to, and the bringing up to date of the classification and index of the Starke photograph collection.

On about thirty of the French face thinning trees at Kingsley frequent scrapings were made with a hook scraper. Since no gum weights have yet been taken it is impossible to say how effective this style of renewing a streak will prove to be.

Harper and Rudolph finished their analyses of the tree sections cut in the extensive survey work some time ago and practically all of this work is now completed as well as the office computations so that all that remains to be done is to summarize and write up the results.

Forestation

Sorting directions for the punch card records of the Bogalusa plantations were completed and sent to Washington the middle of July. Wakeley spent the balance of the month working up seed records and germination test data.

During the month the New Orleans City Parking Commission turned over to us a large bed in the Commission nursery. This will be used at first for certain exotics, including some Eucalyptus, sent us for trial, and later will probably serve for certain of Pessin's physiological and Wakeley's forestation studies.

Protection, Insects

Wakeley's cages at Bogalusa yielded definite proof that the pine tip moth, Rhyacionia frustrana, in the Gulf Coast States can complete its life cycle in six to eight weeks. Of three cages in which living moths had been inserted May 14, and from which all moth remains had been removed June 18, all three when examined on July 14 showed typical tip moth damage on enclosed twigs; one contained a living pupa and a fresh empty pupa case; and one contained not only empty pupa cases but living and freshly dead moths. There had been no tip moth damage during 1930 to the twigs in any of the three cages; one had been undamaged since July 4, 1929. The twigs in seven check cages, in which no moths were inserted May 14, showed no sign whatever of tip moth damage on July 14. The results of this test confirm other evidence gathered by the Station and indicating four complete generations of the tip moth per year. The insect is a serious source of damage to loblolly and shortleaf pine plantations.

During July the erosion men made detailed contour maps of three separate areas; two in Lafayette county and one in Carroll county. One of the areas mapped in Lafayette and the area mapped in Carroll county will be used in connection with the gully reclamation work carried on cooperatively between the Mississippi Extension Forester, the County Agents, and the Experiment Station. Linder's pasture, near Oxford, was mapped and the following data concerning it was obtained by planimetering the areas shown on the map:

	Acres	Per Cent of Area
1. Waste Land		
a. Due to erosion	= 9.80	- 11.77
b. Due to other causes	= 1.67	- 2.00
2. Pasture (unimproved)	= 28.76	- 34.53 per cent
3. Woodland	= 22.84	- 27.42 per cent
4. Cultivated	= 20.22	- 24.28 per cent
TOTAL	83.29 acres	100.00

The pasture land for the most part was formerly cultivated land but had been so cut up by erosion that it could no longer be cultivated. The 9.8 acres of waste land due to erosion include only the land surfaces that have eroded to such an extent that the bare soil is exposed. Considering the pasture as former agricultural land it may be said that as a result of erosion, 46 per cent of the total area has been ruined for agricultural use.

Economics

The work in economics during July included both gathering of field data and writing of reports for counties in three or four different states.

Hayes and Craig spent the month in Hempstead County, Arkansas, assisted by Prof. R. P. Holdsworth, gathering material for the first county study made in Arkansas. Dr. Ziegler spent two days in the field with this crew. On July 21 Spillers and Reynolds started field work in Bradford County, Florida, with headquarters at Starke, Dr. Ziegler joining them July 27.

Meanwhile Bond spent the entire month working up the report on Beaufort County, North Carolina. Dr. Ziegler and Spillers spent the first part of the month on the report on Washington County, Florida, with some corrections on the reports for Appling County, Georgia and Lee County, Alabama.

Spillers, Bond, and Dr. Ziegler spent one day at Bogalusa going over the Great Southern Lumber Company's mills and plantations, and discussing future work with the company's foresters and with Mr. Cushing, the general manager.

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RESEARCH - REGION 2

Practically all of Roeser's time was given to two investigative projects, the study of natural reproduction under various cutting methods in Douglas fir (Mc-161) at Fremont, and the effect of grazing upon run-off and erosion (Pa-101, Cattle) on the South Platte area of the Pike Forest.

The comprehensive study of Douglas fir reproduction under clear-cutting, shelterwood and selection cuttings was begun in 1916. Until 1926, annual counts were made. In the latter year, the shelterwood stand was removed and this year's observations were intended primarily to check the condition of the new stand on the cleared shelterwood area. The results indicate that loss through logging, in which especial care was taken to inflict as little damage as possible upon the seedling crop, was inconsequential, and was more than compensated by a heavy crop of seedlings resulting from a copious seed crop in the year of felling. This final crop had a high percentage of survival. It is estimated that approximately 10,000 seedlings per acre occupy the site, ranging from three to sixteen years old, with some of the trees of measurable (d.b.h) size. The retention of

the shelterwood not only resulted in the establishment of a 100% stand of young growth, but, incidently, tended to retard the occupancy of the area by the invading aspen "nurse" stand until the reproduction crop was fully established. While it is believed that the presence of aspen on such sites is beneficial from a silvicultural standpoint, its tendency to come in very thickly is not without its objectionable feature, since it results in the building up of a more or less impenetrable (for coniferous reproduction) leaf mulch. Such a condition now exists on the plot originally clear-cut in 1916, where the second growth stand is so limited as to throw out of consideration, insofar as continuous timber production is concerned, this method of handling mature even-aged Douglas fir stands in the Rocky Mountains.

Earlier results in this study indicated that a modified selection system (based on size rather than age classes) would yield results fairly comparable with those procured on the shelterwood plot, so far as reproduction is concerned, but it is now evident that the development of the seedling stand, which started when the stand was opened, is adversely affected by the presence of the old stand (280 trees per acre), and a large number of the seedlings are showing signs of stagnated growth. The deleterious effect of this competition is quickly evident when the reproduction on the control plot, depicting virgin forest conditions, is examined. A large crop of new seedlings is produced annually but only a fractional part of 1% of each crop survives the first season. It is doubtful whether 300 established seedlings are present per acre, and their height growth rate scarcely averages more than one inch every two years!

The results of this experiment, in establishing the advantages and disadvantages of various cutting methods in the management of a specific timber type, are about as outstanding as any obtained to date in any of the management studies in this region.

During the last week of the month Roeser accompanied Deputy Supervisor Petheram of the Pike Forest on a trip to the grazing erosion study area near South Platte, Colorado, in the Front Range. The purpose of this trip was to study the progress of erosion by measurements made at permanent "erosion" points and to establish additional points in order to enhance the value of the results to be obtained from the study. The original working plan called for vertical and horizontal measurements to be made at a limited number of points in the main drainages of four small denuded watersheds, two of which were fenced against grazing and two left unprotected. Several of the original markers, which were buried to a depth of about 15" in the middle of the channels, have been lost in washouts. To eliminate this objectionable feature and to provide a basis of more accurate information, it was decided to permanently locate a series of cross section points where channel profile measurements are to be made which can be plotted so that the course of cutting and sedimentation can be graphically depicted. Likewise, advantage was taken of the presence of permanently established iron pipe

vegetative quadrat corners to procure profile measurements at eighteen arbitrarily selected points in order to study the progress of sheet erosion on the area.

During the progress of the work, the investigators were given the opportunity of studying erosion and run-off first-hand by virtue of a violent rain-storm, during which approximately 3/4 inch of rain was precipitated in about 20 minutes. Although all of the channels are normally dry, each carried a stream of water from bank to bank which varied from a couple of inches to probably a foot in depth during the storm. Except in the larger channel of the unfenced area, these streams disappeared within a period following the storm equal about to the duration of the storm. In the excepted channel, an appreciable stream was still flowing twenty-eight hours after the storm. One of the two foot iron markers, which was sunk to 18" in this channel at its widest point, immediately after the storm, was found washed out the next morning due to the cutting of the channel by seepage water.

Insofar as could be ocularly determined, erosion is more pronounced on the grazed area and this is attributed both to the mechanical disturbance of the soil by grazing animals and to a less dense grass and herbaceous cover, whose value in binding the very porous disintegrated granite soil is of outstanding importance. At best, the vegetative cover in the region is scanty. Any factor which tends to reduce it farther apparently operates to increase at a many-fold more rapid rate the erosive effect of the occasional heavy rain-storms which may be expected at any time during the vegetative season.

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MANUSCRIPTS

APPALACHIAN

Cooperative Marketing of Farm Woods Products in Western North Carolina. I. H. Sims.

SOUTHERN

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NORTHERN ROCKY MOUNTAIN

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Yellow Poplar Primer. E. F. McCarthy and L. F. Kellogg (Farmers' Bulletin).

CALIFORNIA

Fire, a Problem in American Forestry, by E. I. Kotok (Scientific Monthly).

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Averell, J. L. — How much does it cost to thin? (Note in Jour. of For. April, 1930)

Bates, C. G. — One-year storage of white pine seed. (Jour. of For. April, 1930)

Demmon, E. L. — Relation of forest research to the naval stores industry. (Jour. of For. April, 1930)

Forbes, R. D. — Progress in the research reserve program. (Note in Jour. of For. April, 1930)

Isaac, Leo A.	Seed flight in the Douglas fir region. (Jour. of For. April, 1930)
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" " "	Seedling Survival on burned and unburned surfaces. (Jour. of For. April, 1930)
Lowdermilk, W. C.	Influence of forest litter on run-off, percolation, and erosion. (Jour. of For. April, 1930)
McArdle, R. E.	Effect of fire on Douglas fir slash. (Jour. of For. April, 1930)
Mirov, T. N.	Turpentining experiments with western yellow pine in Northern California. (Jour. of For. April, 1930)
Scholz, H. F.	How long does hardwood slash remain in a fire menace? (Jour. of For. April, 1930)
Stickel, P. W.	Artificial versus natural replacement on blight-killed chestnut land. (Jour. of For. April,1930)
Wakeley, P. C.	Panaceas, Specifics, and the forestry situation. (Jour. of For. April, 1930)
" " "	Fitting forest planting to American needs. (Jour. of For. April, 1930)
Winters, Robt. K.	Suitability of the Liljenstrom Dendrometer for reading diameters of trees in black walnut plantations. (Jour. of For. April, 1930)
Wyman, Lenthall	Higher returns from turpentine forests. (Naval Stores Rev. June 21, 1930)
Zon, Raphael	The search for forest facts. (Am. For. and For. Life, July, 1930)

Woods and Mill Studies

In determining the proper selective cutting system for a given area the height of the timber as well as the species and diameter should be considered. Though the percentage of diameter classes present may remain fairly constant over a considerable area, the relative height of the trees may vary considerably due to elevation, aspect and slope. In general, the value of the products per M feet cut from short trees is less than that cut from tall trees of the same diameter. In some cases the spread in value between different heights of trees is greater than between diameter classes.

The following table illustrates the effect of height on the value. The figures were compiled from data collected in the western yellow pine woods and mill study on the J. Neils Lumber Company operations in northwestern Montana. The basis is on a relatively small number of trees.

Effect of Height on Value
Western Yellow Pine
J. Neils Lumber Co. Operations

D.B.H of Tree	Logs per Tree	Value per M. Lumber Tally	Spread	Value per M Av. 14" Tree	Spread
14"	2	$20.76			
14"	4	22.28	$1.52	$21.77	
					$1.77
16"	3	21.50			
16"	5	27.63	6.13	23.54	
					1.02
20"	4	23.82			
20"	6	26.79	2.97	24.56	
					4.07
24"	4	28.08			
24"	6	28.81	.73	28.63	
					4.56
30"	4	30.22			
30"	7	37.64	7.42	33.19	
					2.44
33"	4	26.72			
33"	6	31.76	5.04	30.75	

Lumber Census

During July the 1929 lumber and timber products canvass was completed for South Idaho. In North Idaho all but five of the concerns listed have made returns. Of these four are listed as loggers or miscellaneous timber products producers and one as a sawmill operator. A return was received from this one sawmill operator but it was returned for additional information. Practically all of the returns from Montana operators have been received but the work of editing and tabulating has not yet been completed.

Based on preliminary figures the Idaho 1929 cut is 4.9% higher than in 1928 and has been exceeded only in 1923 and 1925. The cut of 145 Idaho mills in 1928 was 977,468 M feet board measure compared with a 1,025,720 M feet cut by 125 mills in 1929. Mills cutting less than 50 M feet annually are excluded from the above figures. In 1929 there were 53 mills of this size producing a total of 1,259 M feet. In 1929 the Idaho mills produced 91,814 M pieces of lath and 18,089 M pieces of shingles as compared with 93,060 M pieces and 12,499 M pieces respectively in 1928.

Wood Utilization Studies

Mr. Anderson with one assistant spent the month of July in the field collecting data on waste after logging in the lodgepole pine and larch-fir types, as well as getting additional information on utilization in lodgepole pine and in western larch. Waste after logging data were obtained on 42 1/5-acre plots in lodgepole pine and 25 1/5-acre plots in larch-Douglas fir.

One thousand and fifty larch tie logs were tallied through a tie mill in northwestern Montana to obtain the number of ties per log and tree by diameter classes and the amount of side lumber by grades. The amount of merchantable lumber and lath in the slabs was also recorded. The tie mill at which the study was made is a very efficient layout. The mill averaged 800 ties per day including moving and set-up time.

Stumpage Prices

The annual stumpage price report for 1929 was held up until July awaiting the report of one of the large Montana operators. The completed report was sent out during the month. Stumpage prices were obtained separately by species from Forest Service and Indian Service sales, State of Idaho and State of Montana sales and sales and purchases by private operators in both Idaho and Montana. The 1929 report is based on the sale and purchase of 366,504 M feet of timber.

The following tabulation shows the stumpage price per M paid for the different species during 1929. Stumpage price summaries are being computed back for every year that records have been kept.

STUMPAGE PRICE SUMMARY
1929
Price Per M

Species	:1 :Forest :Service	:2 :Indian :Service	:3 :State of :Idaho	:4 :State of :Montana	:5 :Private :Idaho	:6 :Private :Montana
I.W.Pine - Green	$4.22	-	$7.38	-	$5.89	$2.66
I.W.Pine - Dead	2.44	-	-	-	-	-
W.Y.Pine	2.57	3.07	2.52	3.00	2.12	2.31
Lodgepole Pine	2.73	-	-	3.00	-	4.00
Douglas Fir	1.75	-	-	-	-	-
Larch-D. Fir	1.09	2.05	1.00	3.00	.74	1.43
Cedar	6.86	-	7.00	-	5.42	-
Engelmann Spruce	1.37	-	-	3.00	1.00	2.64
Mixed	.65	-	1.02	-	.46	-

1. Basis - 77,681 M
2. Basis - 15,116 M
3. Basis - 48,368 M
4. Basis - 13,230 M
5. Basis - 136,124 M
6. Basis - 75,985 M

Lumber Prices & Movement

Av. Mill-Run Prices	Annual, 1929	1st Q., 1930	April, 1930	May, 1930	June, 1930
Idaho White Pine	$34.44	$35.33	$34.38	33.65	35.21
Western Yellow Pine	26.17	24.57	23.77	23.46	22.62
Larch-Fir	20.29	18.35	19.03	17.63	18.15
White Fir	20.94	19.45	20.26	18.80	18.72
Spruce	24.23	23.51	22.66	23.46	22.54

Shipment & Cut	1929	1930
Shipment	161,760	119,327
Cut	170,585	151,310

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Felling and Bucking Study, Douglas Fir Region

During the month Spelman and Johnson completed Plot 3 at the Sappho camp of the Bloedel Donovan Lumber Mills. The plot included approximately two acres and 96 trees; Douglas fir, 12; western hemlock, 58; Sitka spruce, 4; and snage, 22. The Douglas fir ranged from 41 to 92 inches, mostly from 73 to 84 inches; the hemlock from 10 to 56 inches, mostly from 14 to 40 inches, and the spruce from 19 to 85 inches. The average age of the Douglas fir was around 370 years. The company bucks the timber into 16 to 40-foot logs, mostly 32 to 40 lengths. Where breaks are bucked out the buckers are allowed the scale of a 24-foot log with a small-end diameter equal to that of the break. The fallers are allowed the merchantable log scale.

The timber, as to volume, consisted mostly of decadent Douglas fir. On a portion of the area, where the fir timber consisted mostly of snags, a considerable increase in growth rate of the hemlock was observed. The character of the wood in the released growth was also quite striking. Instead of the usual brownish heart stain, the presence of considerable shake and a high percentage of summer wood, the released growth had a light uniform color, was more uniform in texture, as well as free from shake and rot. The following shows the relative increase in basal area at the stump based on rings counted along an average radius:

Average Percentage of Increase, Per Annum by Decades, in the Basal Area of Five Western Hemlock Trees

Decade	Tree No. 1	Tree No. 2	Tree No. 3	Tree No. 4	Tree No. 5
Years	Per cent	Per cent	Per cent	Per cent	Per cent
10-20	37	46	29	38	29
20-30	27	15	8	8	8
30-40	13	12	15	8	12
40-50	8	15	7	9	5
50-60	4	6***	7	7	16***
60-70	4***	18	6	4	34
70-80	8	24	3	6	19
80-90	12	8	3***	3	7
90-100	5	6	22	4	
100-110			11	2	
110-120			6	4***	
120-130				13	
130-140				19	
140-150				8	

*** Apparent age of release in growth

In the February, 1929 issue of the West Coast Lumberman reference was made to the use of the Wolf chain saw in the falling and bucking of Douglas fir. In this connection Spelman and Johnson visited the operation of the Stimson Timber Company, near Belfair, Washington where a saw of this type was reported to be in use. It was found that the saw had been tried out there but had not proved a complete success and its use had been discontinued. The main objection to the saw was its weight (almost 70 pounds) and the difficulty in dragging long lengths of power cable through the brush; the practice was to set the electric generator at the spar pole and work out for a distance of 900 to 1000 feet. Its operation required four men; two to operate the saw and two to handle the power line. It was the experience of this company that the output of the chain saw per day did not greatly exceed that of two sets of ordinary fallers. The saw required filing every three to four days and could be filed but thirty to forty times before requiring replacement; this alone made the machine quite expensive since the price of a new saw is around $90.00. The operator felt that the chain saw could be used more successfully for bucking; however, he stated that it could not be used for under cutting as its operation required a man at each end of the saw. He was of the opinion that the saw would probably work successfully in the pine region where the ground is more level and free from underbrush, but that in its present stage of development it was not practicable in the Douglas fir region because of the broken character of the ground and the heavy underbrush.

Survey of Sawmill Waste in the Douglas Fir Region

Hodgson served as a Special Deputy Fiscal Agent for 13 days in connection with the fire fighting on the Deschutes National Forest. Other than this he continued with the computation of the data secured in the study of four hemlock mills last spring.

1929 Census of Lumber, Lath, Shingles, Logs, Cooperage and Veneer

Most of Gibbons' time was devoted to this survey. At the close of July, 1425 reports had been mailed to Washington, of which 571 were forwarded during that month. In addition, there were 300 reports edited and ready for transmission to Washington.

Publications

Johnson's report, "Utilization of Bigload of the Pacific Northwest" was forwarded to the Forester's office for editing and publication. The report was reviewed by several members of the Forest Products Laboratory, Mr. Munger of the Experiment Station, and Mr. Hanzlik of the office of Forest Management.

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MONTHLY REPORT OF THE FOREST TAXATION INQUIRY

Two additions to the technical staff have been made during the month. Mr. Wade E. DeVries, Forest Economist, comes from the Michigan Department of Conservation, where he was formerly economist for the Land Economic Survey and more recently in charge of the sale, homesteading and exchange of state lands. Miss Besse B. Day, Associate Statistician, was formerly in charge of the statistical work in the Research Department of the Victor Talking Machine Company and was more recently temporarily employed by the Bureau of Labor Statistics. Miss Day will take the place of Miss Epps in charge of the statistical work, as Miss Epps expects to leave about September 1 to take a position in connection with Harvard University.

The field work in North Carolina was completed, except for some few details which will have to be taken care of later. The office work is continuing at New Haven, both Wager and Thomson being in the office during the last part of the month. The punching of the Hollerith cards on this project has been completed, and the cards are being tabulated in the Washington office.

Work on progress reports has continued, a large part of the staff being engaged on that work during the month. A completed report, No. 11, entitled "Tax Delinquency in Selected Counties of Oregon and Washington" by Daniel Pingree was sent to Washington for publication in the usual form.

Fairchild prepared an outline of the final report, which was discussed in a number of staff conferences and revised. Sources of information to be used in preparing the different parts of the report were also listed in a preliminary manner. The greater part of the report was divided into individual assignments, and parceled out to the various members of the technical staff. Owing to the large amount of work involved in completing the progress reports now in course of preparation, and in conducting additional field projects, it is not expected that much can be done on these assignments for some time.

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RANGE RESEARCH

WASHINGTON

The month of July passed quickly considering the investigative programs and numerous other matters which it was necessary to complete before Mr. Clapp left for the field.

1930 International Livestock Exhibit

The general plan for the Department's exhibit for the International Livestock Exposition to be held in Chicago is to center on sheep. The Forest Service part of the exhibit will cover range utilization - proper time and intensity of sheep grazing.

The purpose of the exhibit will be to show the practical value to range land owners and stockmen of the improved methods developed by research. Many sheepmen now start grazing ranges before the feed can stand grazing and come back over the range every few weeks grazing what forage there is close to the ground. This results in delayed start of growth of forage in the spring, smaller feed production and stunted, thin lambs. This of course is reflected in the market classification given the lambs and in the sale price. On the other hand the studies have shown that for fat lamb and top feeder lamb production the ewes and lambs must have plenty of good palatable and succulent herbage. This can be secured on the semi-arid western ranges by allowing the forage a vigorous start before grazing, having sufficient interval between grazings, and not grazing too close to the crown of the plant.

It is proposed by a film strip to show, either by animated drawings or selected photographs, the gradual development of range vegetation until it is ready for grazing, then grazing to a proper degree followed by a re-growth and another grazing, and finally by a third re-growth and grazing. It is aimed that the views will bring out range readiness, proper degree of grazing at each period, how closely the range should be grazed in the fall, and the development of fat lambs by this method of grazing.

The exhibit will also show the disadvantages of too early grazing and too heavy and too frequent utilization both on the foliage and roots of the vegetation and on the livestock. A small leaflet will accompany the exhibit, bringing out the results of proper time and intensity of utilization.

RANGE FORAGE INVESTIGATIONS

Dayton's Field Trip

Dayton returned July 15th from a 47-day field trip in Regions

3, 4, and 5. He had four major objectives: (1) To obtain a first-hand general familiarity with current range research work in the field; (2) To obtain, so far as possible, answers to certain administrative questions concerning the plant identification project and to assist field personnel in any way possible; (3) to obtain data useful in further work on the bulletin on important Southwestern range plants, by M. W. Talbot and himself and, if possible, for use in other prospective publications, and (4) to become acquainted with field personnel, especially those engaged in range research.

In Region 3, where the greater part of Dayton's time was spent, the dry spring period of observation was as a whole very unfavorable to viewing the vegetation, particularly the grass types. However, a considerable amount of collecting and annotation was done. Here Dayton saw the Jornada and Santa Rita Range Reserves for the first time, went over with Directors Campbell and Culley a considerable part of their sample plot work, and went over the Jornada herbarium. Naturally, the Jornada looked much drier than the Santa Rita; the calf crop on both seems exceptionally good, practically every cow one sees has a calf, evidently a reflection of good growing conditions in 1929. Cooperrider also took Dayton over the reproduction study plots on the Wild Bill allotment near the Fort Valley station. A trip from Flagstaff to Tucson enabled Dayton to see a number of vegetative types that were new to him, some horrible examples of overgrazing and erosion, and some administrative enclosures which show distinct possibilities of grass recuperation. A 650-mile automobile trip was taken with Director Culley and Supervisor Winn through the Chiricahua Mountains and the vicinity of the Coronado National Forest. Though the fire season had been bad precipitation was above the average, there were showers almost every day of the trip, and the vegetation on the whole was in good shape though naturally the grass types were not in the best shape for collecting or photographing.

A short stop was made at the Boyce Thompson Arboretum at Superior, Arizona. A little over two days was spent at the Leupp Indian Agency in northeastern Arizona, where Cooperrider and Dayton were the guests of Mr. William Thomason, who is in charge of range work for that portion of the Navajo Reservation. Because of the season, drought, and the extreme overgrazing, conditions were not propitious for studying the vegetation. Mr. Thomason is keenly alive to the fact that the livelihood of the Indians is dependent on the range and its proper care and is eager to do all that possibly can be done to correct the present situation but the difficulties in the way are enormous. Probably the most tangible thing that resulted from the trip was a rough vegetative type map of the Agency which Cooperrider started.

While in Albuquerque Dayton spent one day with Talbot on a trip to the foothills of the Sandia Mountains, following a small band of goats for a while, and also west of Albuquerque in a sand dune type where there is this year an enormous quantity of loco (Astragalus

diphysus). He also looked over the Albuquerque office herbarium, making numerous notes for the Washington office records, and also for the benefit of the Regional office on synonymy and nomenclature, misidentifications, wrong filings, etc. A similar treatment was accorded the small herbarium of the Manzano Forest. Through the kindness of Mr. Kerr he also met Dr. Long of the Bureau of Plant Industry and saw his original and interesting filing schemes and discussed with him the apparently new spruce which Dr. Long discovered in the Sandia Mountains on the Manzano. While in Tucson Dayton was enabled to meet many members of the University of Arizona faculty, with a number of whom he has had extended correspondence in the past on official matters.

Nearly two days were spent on the Cleveland National Forest in Region 5, where the cool bracing weather was a delightful relief after the intense heat of the Southwest. Grazing on the Cleveland is unimportant, there being only about 1000 head of permitted stock. It is essentially a protection-recreation Forest, with a little over 500,000 acres gross. The Washington office has but little record of range plant collecting on the Cleveland, and the vegetation was quite new to Dayton. Probably a large part of the specimens collected will be new to Service plant records. Two of the more interesting plants of this region are the tall, extremely showy Matilija poppy (Romneya coulteri) and the famous indigenous Torrey pine. In the short time available with Supervisor Anderson only parts of the Pine Creek and Laguna areas, north and east of San Diego, could be visited.

At the request of Asst. Regional Forester J. W. Nelson Dayton spent one day in the San Francisco office, where opportunity was taken to read various memoranda and reports, including a very interesting one by Leland Smith, in cooperation with Dr. George Hunt of the University of California, on bluebrush. Incidentally, Dr. A. W. Sampson is making a study of the effect of heat (fire) on the germination of bluebrush seed. Hutchinson asked Dayton to look over the "Let's know some trees" mss., which it is proposed to reissue. Dayton went over, in a necessarily very casual way, the recently fumigated Regional 5 herbarium, which consists of 4 full cases containing approximately 4000 sheets, mostly heavy cardboard mounts, filed in the D. T. & H. sequence. Messrs. Nelson and Beeson report that interest in plant collecting in Region 5 is not very high at this time nor the herbarium much used; the silvicultural herbarium has been sent to the California Forest Experiment Station at Berkeley.

Two days were spent in the Ogden office. Dayton discussed with Messrs. Winkler, Stewart, and Standing the status of plant identification in Region 4. The feeling in that Region appears to be that, so far as Region 4 is concerned, the forage investigation project should remain in statu quo, i.e., comparatively quiet, letting those who want to collect do so and not forcing those not interested

in collecting to collect. The Regional 4 herbarium consists of 3 wooden cases containing about 556 genera and 2400 species arranged in the D. T. & H. sequence. They are much troubled by dust but not at all by insects. Duplicates are gotten rid of as fast as possible; mostly heavy mounts are used. Miss Christensen keeps the herbarium very neatly and it is elaborately indexed.

The last week of field work was spent at the Great Basin station (now the proposed Wasatch Plateau Branch of the Intermountain Forest and Range Expt. Sta.) which Dayton visited for the first time. On the mornings of July 4 and 5 there were symposia, participated in by Messrs. Forsling, Hill, Standing, Stewart, Sanford, Hormay, and Dayton, on work of the Station, Boise erosion problems, range reconnaissance, botany, and carrying capacity. Heavy showers rather seriously interfered with field work during the last few days of Dayton's stay but he managed to see a good proportion of the experimental plots at Alpine station, Bluebell Flats, and other adjacent areas. Particular attention was paid to field observations and collecting suites of specimens in groups which are extremely confusing to workers with range vegetation in this locality, especially the genera Agropyron, Bromus, Geranium, Mertensia, Stipa, and Viola. It is hoped that, with the material and notes collected, personal conferences can be made with taxonomic specialists in Washington and that the idea that there are too many species in these groups can be "sold" to them.

While waiting in Ephraim opportunity was taken to examine a portion of the Manti Forest herbarium. This is a large collection, interesting as one of the three original Forest herbaria in the Service and has Tidestrom's 1907-8 plants, mounted on small thin sheets, which are not represented in either the Ogden or Washington offices. Here also, a true specimen of Agropyron spicatum was found, typical specimens of which had been searched for in vain while at the Great Basin Station and which we had tentatively felt did not occur on the Manti.

Miscellaneous

Fourteen collections, representing 482 plants, were reported out to the field during July. Twenty-two of these plants were additions to Forest Service range plant records. About 100 plants were filed in the herbarium, and 180 plants were mounted.

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GREAT BASIN

General

Forsling returned from Washington early in June and after a few days at the office in Ogden went on a field trip with Assistant Regional Foresters Woods and Winkler and R. J. Becraft, Professor of Range Management of the Utah State Agricultural College for the purpose of tentatively selecting a number of natural areas on range lands (research reserves) in the Intermountain Region. The trip covered parts of the Uinta, Wasatch, Cache, Sawtooth, Challis, Payette, and Boise National Forests. Several fair sized areas were selected including ones on Mt. Timpanogos and City Creek watershed near Salt Lake City on the Wasatch Forest, Mink Creek watershed near Pocatello, Idaho, on the Cache National Forest, and the head of the South Fork of the Payette River on the Boise National Forest. In addition at least one area of about 10 acres in size will be proposed on each of the National Forests visited and will include each of the major range types in the region.

Following this trip, Forsling spent several days with the field party that is continuing the range erosion survey on the Boise National Forest.

Nelson spent June 20 and 21 at the field meeting of stockmen in the Pine Valley mountains on the Dixie National Forest where he gave a talk on the results and their application of the study of the management of browse range. Approximately one hundred stockmen were in attendance from southwestern Utah, northern Arizona and southern Nevada. The Extension Service of the Utah State Agricultural College and Forest Service cooperated in giving the two-day program.

Field Assistants

The field assistants for the season include August L. Hormay, University of California, E. H. Bomberger, Penn State, Allan G. Watkins, Oberlin College and Ralph Roberts, University of Utah. All except Roberts have received their Bachelor's degree and expect to take the J.R.E. examination next spring.

Miss Sylvia Griswold, University of Chicago, reported at the Station on June 13, to continue her study of seed problems with range plants.

Appointment

Kenneth Pearse, who received his B.S. degree from the University of Chicago, was appointed from the Junior Range Examiner

eligible list and assigned to assist Renner on the range-erosion study on the Boise River watershed.

BOISE EROSION PROJECT

Snow Surveys

The snow surveys which were made in the higher country during March and April have aroused considerable interest among the water users dependent upon the Boise watershed. An illustrated article pointing out the value of such surveys, describing the methods used, and giving the results thus far, was given a full page in a recent issue of the "Boise Statesman." Offers of cooperation in financing future work of this nature has been received from interested groups of water users and further cooperation is expected from the State of Idaho.

Range-Erosion Survey

The five-man erosion-grazing survey crew started field work on June 12 and expect to cover approximately two hundred thousand acres on the South and Middle Forks of the Boise River by the end of the season. Refinements in the regular range survey methods have been worked out to show the influence of slope, soil, cover and utilization on erosion. R. R. Hill of the Washington office and A. R. Standing of the Regional office visited the party and in company with Renner made a two-day pack-trip over the higher country in the vicinity of Trinity Mountain and the heads of Fall and Smith Creeks.

The range-management-requirements phase of the erosion study is getting well under way with seven areas selected for detailed studies and a charting crew already at work. Plans are to establish and chart 57 meter-quadrats, and rechart 16 quadrats established a number of years ago on the Boise and Sawtooth forests. In addition 66 correlation plots on which the density and composition of the vegetation will be estimated, and areas of the perennial plants measured, will be established. Approximately one-half of the quadrats and correlation plots will be enclosed to protect them from range stock. This study of the vegetation is aimed to show the change in plant cover under various conditions and the rate at which vegetation will reclaim eroded areas and check erosion.

The quadrat work is being done under some difficulties. On much of the area concerned the slopes are very steep, some of the quadrats being located on 65-70 per cent slopes. In charting it has been found necessary to use a board platform or frame around the quadrats to prevent excessive trampling by the man operating the arm of

the chartograph. The coarse loose soil slides so readily that even heavy canvass placed around the quadrat gave practically no protection. The frame, which is made of 12 inch boards, is bolted together at the corners and provided with four holes through which twelve inch spikes are driven into the soil to prevent the frame from sliding down the hill. Cross cleats were necessary to enable the operator to stay on the frame while working.

Spring-Fall Range Study in Utah

Field work was started on the study of Utah's spring and fall ranges on May 1. Pickford spent the greater part of May and June studying the vegetation on spring-fall range areas in the region north of Great Salt Lake and in the foothills of the Wasatch mountains east of Ogden.

This preliminary study is a general survey, in which the vegetation on average grazed plots, was compared with plots which had been totally or partially protected from grazing. The density and composition of the vegetation was estimated on all plots and a complete historical write-up was made of each plot studied. In all, 18 protected plots were found. These plots were located in unused portions of old cemeteries and adjoining dry land grain fields. Thirty-nine grazed plots were studied.

Preliminary analysis indicate that range fires and improper grazing practices in the region have resulted in a decrease of 11.0 per cent in density and 47.0 per cent in grazing capacity. The original plant cover, as indicated by the protected plots, had a 0.40 density. Perennial bunch grasses made up 67.0% of the composition. The present herbaceous cover on the grazed ranges consists principally of Bromus tectorum and poor perennial weeds, annual weeds and sagebrush. Bunch grasses which were the principal forage resource of the original herbaceous cover, have been reduced 71.7%.

Spring-Fall Range Studies in Idaho

Craddock completed a two and one-half months stay on the spring-fall range at Dubois, Idaho. For the first time since the cooperative range studies were initiated in 1923 sufficient time has been made available for a complete analysis of the project and to fully complete recurrent measurements of vegetation, climate and carrying capacity. New activities were started to strengthen the project by intensifying and refining much of the detailed study of vegetation and climate.

Measurements of the response of the native vegetation to the influence of climate were strengthened by doubling the number of pro-

tected quadrats from four to eight, establishing a staked plant area for precise measurements of individual species which are to be harvested annually, by the addition of two new correlation plots which are to be harvested to determine fluctuations in quantity of forage produced and the selection of four other correlation plots, two of which are to be unmolested, two to be harvested after the sage has been eradicated.

Detailed plans for a complete physical factor station to measure the factors of climate have been submitted. In addition to the measurement of precipitation and air temperature already being made these include soil temperature, wind velocity, evaporation and soil moisture.

The vegetative control to measure the response of vegetation to various intensities of grazing in each of nine 80 acre pastures was increased from one to four quadrats and by the establishment of four sample plot transects, each of which consists of ten plots or a total of forty plots per pasture.

A schedule is being prepared for the addition of four new 80-acre pastures to measure the combined response of vegetation and livestock to a system of rotation and deferred grazing. These paddocks will be grazed by a selected herd according to the system employed on the range of the Sheep Station. The vegetative control will be identical to that in each of the original nine pastures and will consist of a detailed type map, four quadrats in each pasture and a series of forty sample plots. Livestock condition will be measured by regular weighings, wool studies and lamb production.

The 1930 lamb crop is about 15% above normal due to the excellent forage crop in 1929 which maintained the breeding ewes in high condition during breeding, the open winter of 1929-30, and the warm, early spring. The 1930 wool clip was slightly higher than 1929 which may also be a reflection of the thrifty condition of the animals since the 1929 shearing - but may also reflect the constant improvement through selective culling. The 1930 forage crop to date is approximately 20% below 1929 due to a subnormal accumulation of winter precipitation.

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JORNADA

Rains At Last

A fast developing critical situation was relieved early in the month by general rains, in sufficient amounts to start the growing season nicely. Cattle are in good condition and picking up quickly.

An Enigma in Grazing Capacity

The Grazing Year 1930 utilization report was completed during the month. It showed satisfactory use of the Reserve as a whole, and yet a very desirable balance of unused feed. One of the most unusual features was the utilization around New Well, which waters large areas of both the mountain and mesa pastures. Approximately 300 cattle watered at this one well all winter and spring, yet there was little overuse, even when based on the scattering grass cover. The vegetation around New Well is principally mesquite, shadscale, and fine leaved sage, with scattered tufts of sand dropseed and black grama grasses. A reconnaissance of the region which should be properly watered by New Well would probably show yearlong feed for perhaps 100 head; still nearly 300 cows, many with calves, grazed the area for close to 8 months, with no more overuse than is ordinarily expected close to the watering place.

One of the first possible explanations of this situation is that until this year, the type has not been grazed to any great extent since 1924, so that all the vegetation has made vigorous growth and matured unhindered each season for 5 years. Utilization evidence also points to the fact that during the winter and spring season, cattle grazed farther from water than is usually credited. In the rolling mesquite-sandhills, many instances were recorded of very substantial use of the forage at five miles from permanent water. Then again, there is the possibility that certain browse species in the type may have a somewhat higher palatability than has been credited to them. Then there is the final possibility that in their fine state of growth, the browse species may have been overused somewhat without showing it this year. As the area will be stocked permanently in the future, further observations should bring significent facts to light. The most astonishing circumstance of the whole situation is that all the cattle located in the area came through the spring and early summer in much better condition than those on any other part of the Reserve.

Reconnaissance

Canfield and Stanley resumed compilation of the 1928 grazing survey. A week's work was necessary to make certain field checks, especially on control. A new planimeter was secured to permit more rapid completion of this phase of the compilation.

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Range and Stock Conditions

Rainfall to date has been extremely local resulting in certain localities being above normal while others are considerably below. Growth started all over the reserve about the middle of June of approximately a month ahead of the usual time. By July first growth approximated that which usually is found on August first. Very localized showers with intervening dry, hot periods, during July, have held growth back until it is hardly more than normal for August first. In the vicinity of Florida Station, where June rainfall was five times the average and July rainfall very slightly under the average, growth has not responded nearly as well as one would expect. While no definite explanation of this can be offered, it seems not unlikely from such observations as have been made, that the duration of dry periods in-between the rains has been an important factor. Also, much of the percipitation came in the form of light showers which were rendered largely ineffective by high temperatures and dry periods that lasted for several days. Observations on the stand (density) of forage grasses indicate that a very material increase over last year will be recorded this summer unless rains should fail entirely for the rest of the season.

Cattle are in excellent condition all over the reserve and should continue so throughout the summer. Adjacent ranges have improved materially as have cattle and for the most part stockmen have ample reason to be optimistic over conditions.

Miscellaneous

Dr. Robert C. Murphy, Curator of the American Museum of Natural History in New York City, together with his family spent several days at Florida Station during the month. Aside from visiting points of general interest in the region, Dr. Murphy spent a day in looking over the reserve and took a great many photos which he expects to use in illustrating articles as well as in completing a series of moving pictures that he is taking.

Dr. Taylor, accompanied by his assistant, Mr. Hobbs, started an intensive study on the reserve to determine the rodent population as well as the correlation between range types and different species of rodents. He plans to spend a month in the work and will camp at a number of places in each range forage type.

During the latter part of the month Director Pearson and Assistant Director Cooperrider (of the Southwestern Forest and Range Experiment Station) arrived in Tucson and spent several days looking for houses and making arrangements for office space at the University.

Considerable alteration work was necessary to provide sufficient rooms for the personnel of the station but satisfactory plans were finally agreed upon and the University officials started work at once and have already made considerable headway in the work.

Mr. D. M. Gorsuch has recently received a quail fellowship providing for a study of the quail in this region as well as advanced work at the University of Arizona. He plans to spend the greater part of the present summer at Florida Station making an exhaustive study of quail on the reserve.

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